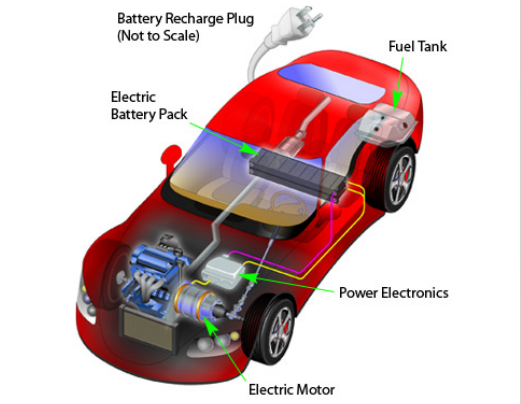
Electa DistriNet RESEARCH GROUP

KATHOLIEKE UNIVERSITEIT LEUVEN

Decentralized demand side management of plug-in hybrid vehicles in a Smart Grid

YRS 2010 YOUNG RESEARCHERS SYMPOSIUM 2010

Plug-in hybrid vehicle



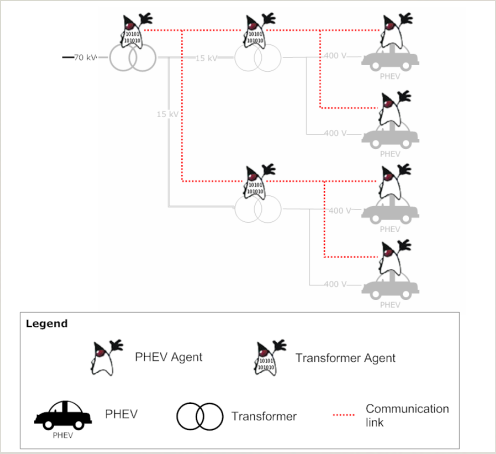
Problem: Grid limitations

- Future (2030)
  - → In Belgium, 30 % of the cars will be PHEVs
- Problem
  - → Grid capacity is limited
  - → Most PHEVs will be charged after working hours and overload the grid during this period
- Challenge
  - → Large-scale coordination of PHEVs

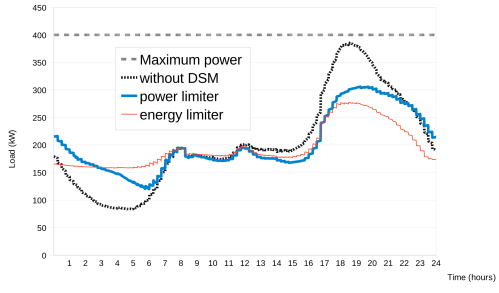
Goal: Demand side management

Coordination of PHEVs for intelligently controlling the charging of their battery

- Multi-Agent System
  - PHEV Agent: charge PHEV in time
  - Transformer Agent: flatten the load
- Coordination strategies
  - Energy limiter
  - Power limiter



Daily load of a 400 kVA transformer with different coordination strategies



Simulation results

- Energy limiter
  - → Known PHEV departure times
  - → Load optimally flattened
- Power limiter
  - → Unknown PHEV departure times
  - → Load less optimally flattened
- Advantages of a distributed solution:
  - → Scalability
  - → Adaptability

Contact: Stijn.Vandael@cs.kuleuven.be March 2010